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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/450.351 11/29/99 YAMAMOTO T SHM-00901

026339 MMC1/0828  
HUTCHINS, WHEELER & DITTMAR  
101 FEDERAL STREET  
BOSTON MA 02110

EXAMINER

TSAILH

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 08/28/01

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

# Office Action Summary

Application No.  
09/450,351

Applicant(s)  
Yamamoto

Examiner  
H. Jey Tsai

Art Unit  
2812



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on paper no. 12, filed 8/3/2001.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 13-29 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 13-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some\* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

- 15) ☐ Notice of References Cited (PTO-892) 18) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 19) ☐ Notice of Informal Patent Application (PTO-152)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 12 20) ☐ Other:

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*Claim Rejections - 35 U.S.C. § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-11 and 13-29 <sup>are</sup> ~~stand~~ rejected under 35 U.S.C. 103(a) as being unpatentable over Tamaru et al. 6,103,566 in view of Nishikawa 6,087,261 and Lee et al. 6,010,940, all are previously applied.

The reference(s) teach the features :

Tamaru et al. substantially discloses a method of forming a capacitor on the semiconductor device, which includes :

forming a tantalum oxide dielectric layer 5, fig. 4B, and col. 16, lines 7+,

treating substrate in the chamber with at least one of a gas containing non-reactive helium or Ar or N<sub>2</sub> gas and NH<sub>3</sub>,

heating the substrate in the NH<sub>3</sub> col. 9, lines 44+,

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Nishikawa substantially discloses a method of forming a capacitor on the semiconductor device, which includes :

forming a tantalum oxide dielectric layer 5, fig. 4B,

treating substrate in the chamber with at least one of a gas containing non-reactive  $\text{NH}_3$  and helium gases flow, col. 9, lines 1+,

heating the substrate in the  $\text{NH}_3$  ambient at about 0.15 torr, fig. 6, col. 9, lines 30+,

The difference between the reference(s) and the claims are as follows:

Tamaru et al. lacks vacuum pressure. However, Nishikawa teaches heating the substrate in the  $\text{NH}_3$  ambient at about 0.15 torr, fig. 6, col. 9, lines 30+. And, Lee teaches annealing the substrate with  $\text{NH}_3$  after forming  $\text{TiN}$ .

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Tamaru's vacuum pressure at less than 1 because a better non-reactive ambient can be obtained at the lower the vacuum pressure.

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Applicant's arguments filed Aug. 3, 2001 have been fully considered but they are not persuasive.

Applicant contends that Nishikawa teaches using an oxidizing ambient and not an inert ambient. This is not found to be persuasive because 1). Tamaru's teaching containing only Ar or N<sub>2</sub> or He. 2). Since claimed invention containing reactive gas NH<sub>3</sub>, hence, the limitation of non-reactive with respect to metal oxide is not consistent with the claimed invention. Nishikawa teaches one of gases is helium gas which is an inert gas, hence is non-reactive with respect to the tantalum oxide layer 5, therefore, it meets the claimed invention. see col. 9, lines 13+,

Applicant contends that Nishikawa teaches introducing He and oxygen prior to the deposition of metal oxide during the a chamber purging step. This is not found to be persuasive because Nishikawa teaches reduction or reoxidation of Ta<sub>5</sub>O<sub>5</sub> by introducing oxygen and helium is prevented in col. 9, lines 12+. And, oxygen only react with the carbon or hydrogen in the Ta<sub>5</sub>O<sub>5</sub> layer not Ta<sub>5</sub>O<sub>5</sub> layer itself. Tamaru et al. meets every limitation as claimed in claim 1 and Nishikawa meets every limitation as claimed in claim 8.

Any inquiry of a general nature or clerical matters or relating to the status of this application or proceeding should be directed to the Group customer service whose telephone number


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is (703) 306-3329 and Fax number (703) 306-5515. Group receptionist telephone number 703-308-0956.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to H. Jey Tsai whose telephone number is (703) 308-1374. The examiner can normally be reached on from 7:00 Am to 4:00 Pm., Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (703) 308-3325. The fax phone number for this Group is (703) 305-3431.

hjt  
08/26/1



H. Jey Tsai  
Primary Examiner  
Patent Examining Group 2800